

REMARKS

The last Office Action of February 4, 2009 has been carefully considered. Reconsideration of the instant application in view of the foregoing amendments and the following remarks is respectfully requested.

Claims 2-4, 7-21, 26, 31 are pending in the application. Claims 2, 3, 9, 18, 20, 26 and 31 have been amended. Claim 4 has been canceled. No claim has been added. No amendment to the specification has been made.

Record is also made of an interview between applicant's representative and the Examiner which took place on June 2, 2009. The Examiner is thanked for her help and assistance as well as for the courtesies extended to Counsel at that time. During the course of the interview the present application was extensively discussed, and as a result, applicant now submits this amendment to place the application in formal condition for allowance.

CLAIM REJECTIONS - 35 USC § 112

Claim 3 stand rejected under rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 9 has been amended by replacing measuring unit with "receiver" (used throughout the specification) which measures the variable magnetic field component representative of the roll angle of the instrument, i.e., the unit that measures parameters from which the roll angle can be derived.

Likewise, claim 3 has been amended to characterize the evaluation unit as a unit that determines from the quantity measured by the receiver the actual position, direction of instrument and/or roll angle.

Withdrawal of this rejection under 35 U.S.C. §112, second paragraph, is therefore respectfully requested.

CLAIM REJECTIONS - 35 USC § 103

Claims 2-4, 7-14 17-20, 26 and 31 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Russell et al. (US Patent No. 5,265,682; Russell) and further in view of Dickinson et al. (US Patent No. 5,002,137; Dickinson).

Claims 15 and 16 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Russell and Dickinson, and further in view of Bladen (US 5,913,820; Bladen).

Claim 21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Russell and Dickinson, and further in view of Kuckes (US 5,589,775; Kuckes).

Claim 9, as amended herein, recites an apparatus for locating an instrument, with a magnet disposed inside a body of the instrument, wherein the magnet is rotatable independently of a rotation of the body of the instrument and adapted to produce a moving magnetic field extending outside the body of the instrument to generate a magnetic moment which is perpendicular to an axis of the instrument, and a drive for rotating the magnet independent of the body of the instrument. The apparatus further includes variation means for varying the magnetic field generated by the magnet outside the body of the instrument, thereby creating a variable magnetic field component which relates to a roll angle of the instrument; and a receiver for measuring the variable magnetic field component representative of the roll angle of the instrument.

As set forth in the office action, Russell purportedly teaches a magnet which rotates independently of the rotation of the instrument and produces a moving magnetic field to generate a magnetic moment and a drive that drives the magnet independent of the rotation of the instrument shaft. The examiner equates the magnet recited in claim 9 to the array of permanent magnets as indicated at **18**, which according to Russell cooperate with a fixed stator **19** within the casing of the carrier **12**. The magnet/stator arrangement serves as a variable drive coupling between the impeller **15** and the carrier **12**. (Column 7, lines 29-36). As known from design criteria of generators/motors, the magnetic field component exiting the permanent magnets **18** is at most a stray field which is further shielded by the impeller and by the tubular drill collar **10** forming part of the drill string in a steerable rotary drilling system. Accordingly, the magnetic field

produced by the permanent magnets is not suitable for making any inference on the properties of the permanent magnets, for example their orientation. In fact, Russell employs separate sensors for measuring the roll angle, stating that "The carrier has one or more internal compartments which contain an instrumentation package comprising sensors for sensing to orientation of the carrier and the associated equipment, described in further detail below, for processing signals from the sensors and controlling the rotation of the carrier. The instrumentation package is indicated diagrammatically at 111 in FIG. 1." (Column 7, lines 9-16).

Accordingly, a person skilled in the art would not look to Russell for solving the problem of determining a roll angle of an instrument from a measurement of an external magnetic field generated by a magnet rotating inside and independent of the instrument body.

In addition, the office action states that Russell teaches variation means for varying the magnetic field generated by the magnet. However, Russell does not vary the magnetic field of the "magnet" identified as **18**, but rather varies the magnetic field of the stator **19**, which is entirely different from the recited variation "of the magnetic field generated by the magnet outside the body of the instrument."

The office action then relies on Dickinson as teaching the use of magnets for determining the roll angle. Dickinson teaches a moling system with a mole head **30** having a slant face **32** and a transversely mounted (fixedly installed) permanent magnet **34**. The permanent magnet **34** does not rotate independently of the mole head **30**, as can be inferred, for example, from column 7, lines 59 to 65: "As the mole head (and thus the magnet) rotates the signal from both the detectors will be sinusoidal ...". A person skilled in the art would therefore not look to Dickinson to arrive at a solution for measuring a roll angle with a magnet disposed inside the body of the instrument, wherein the magnet rotates independently of the rotation of the instrument body.

A combination of the teachings of Dickinson and Russell would therefore at best result in a modification of Russell's apparatus, whereby the magnet **34** disclosed in Dickinson would be mounted in fixed relationship with respect to Russell's drill collar **10**.

However, this combination would not lead to the subject matter of the present invention, as disclosed in claim 9.

In addition, neither Russell nor Dickinson disclose a frequency modulation for varying the magnetic field generated by the magnet, as recited in the dependent claim 20 and in independent claims 26 and 31. With respect to claims 26 and 31, Russell and Dickinson also fail to disclose, as discussed *supra* in conjunction with claim 9, "rotating at least one magnet disposed inside a body of the instrument independent of a rotation of the instrument to produce a magnetic field to generate a magnetic moment outside the body of the instrument perpendicular to an axis of the instrument."

Bladen is applied against claims 15 and 16 as disclosing emission of light beams, laser beams, radioactive beams, sound waves and ultrasound waves. However, Bladen does not disclose a rotating magnet.

Kuckes is applied against claim 21 as disclosing shielding. Kuckes discloses rotating a permanent magnet **40** which is fixedly attached to the housing (col. 3, ll. 10-18; col. 5, line 68 to col. 6, line 4). Moreover, as discussed in detail in applicant's response to a previous office action, Kuckes does not disclose varying the magnetic field generated by the magnet outside the body of the instrument.

For the reasons set forth above, it is applicant's contention that neither one of the applied references, taken along or in any combination teaches or suggests the features of the present invention, as recited in independent claims 9, 26 and 31.

As for the rejection of the retained dependent claims, these claims depend on claim 9, share its presumably allowable features, and therefore it is respectfully submitted that these claims should also be allowed.

Withdrawal of the rejection under 35 U.S.C. §103(a) is thus respectfully requested.

CONCLUSION

In view of the above presented remarks and amendments, it is respectfully submitted that all claims on file should be considered patentably differentiated over the art and should be allowed.

Reconsideration and allowance of the present application are respectfully requested.

Should the Examiner consider necessary or desirable any formal changes anywhere in the specification, claims and/or drawing, then it is respectfully requested that such changes be made by Examiner's Amendment, if the Examiner feels this would facilitate passage of the case to issuance. If the Examiner feels that it might be helpful in advancing this case by calling the undersigned, applicant would greatly appreciate such a telephone interview.

Respectfully submitted,

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